

Enhancement of hydrogen using steam methane reforming system with CO₂ separation

정진영*, 백일현
한국에너지기술연구원
(jyjung72@hanmail.net*)

A pelletized adsorbent was developed in order to capture the CO₂ generated during methane steam reforming reaction. The best adsorbent was manufactured using the organic and inorganic binder. The CO₂ breakthrough test on the adsorbent using the fixed bed reactor found that the amount of adsorption was very high at the reaction temperature of 750 > 700 > 800°C in the descending order. The cyclic operation at the end confirmed that the adsorbent has good reproducibility. Based on the results coming from the methane steam reforming and the CO₂ breakthrough experiments, the basic design of the hybrid reaction process (steam methane reforming with CO₂ separation) was set up. Hybrid reaction test using the device of the lab. revealed high hydrogen and low CO₂ composition compared with the equilibrium composition of the steam methane reforming. In particular, an examination of the average composition through the repeated experiments of the hybrid reactions at the maximum adsorption temperature of the adsorbent of 750°C found that hydrogen had 12 to 14% higher composition in the hybrid reaction compared with the methane steam reforming whereas the composition of CO₂ was 6-8% lower.